UNIVERSITY OF ALASKA FAIRBANKS

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Wood Pellets in Rural Alaska: A Potential Fuel for Communities

Wood has been used for heating in Alaska for thousands of years. Wood is plentiful in many regions of the state and a relatively simple fuel to use. While the basics of burning wood for heat remain unchanged, recent research and advances in technology have led to improved production of wood-based fuels and more efficient burning practices.

Wood pellets in particular have great potential as a fuel source in Alaska for household heating up to large-scale power generation. Pellets are a high-energy, clean burning fuel that can be produced from wood chips, sawdust, logging and lumber mill residues, small-diameter trees and brush, low-quality logs, and almost any other wood and wood waste product. In rural Alaska, the high cost of oil and availability of woody biomass has led many communities to become interested in small-scale community pelletizing operations. Producing wood pellets locally, however, requires a sizeable capital investment and long-term wood harvest plan, while importing pellets from outside the community greatly increases the cost. Although the cost-effectiveness of local pellet production is not proven at this time, the potential benefits merit further consideration as a long-term energy solution in rural Alaska.

What are wood pellets?

Wood pellets are small, cylindrical particles comprised of dried wood products that have been ground up and compressed into pellet form. Usually just an inch long and a quarter inch in diameter, wood pellets resemble rabbit food and have a bulk density of about 40 pounds per cubic foot (up to three times the density of unprocessed wood). Due to the densification process and low moisture content, pellets contain more energy per unit volume than regular wood and when burned release heat in a more uniform manner. Wood pellets are clean burning with minimal particulate emissions. Because they are typically sold in 20- to 40-pound bags, they are convenient to transport and can be stacked without taking up a lot of space.

Wood pellets have great potential as a fuel source. Photo courtesy of iStockphoto.

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Wood Pellets

Wood pellets can be burned in a pellet stove for home heating. Although pellet stoves are more expensive than traditional cordwood stoves, their primary advantage is that they are more convenient to operate. Loading pellets into the stove hopper is easy, clean, and typically required just once a day. Pellet stoves are efficient, distribute heat evenly by means of a forced-air system, and produce very little ash or smoke. Pellets can also be burned in a large boiler for district heating systems.

How are wood pellets made?

The process of turning wood materials into pellets involves several steps, including chipping, crushing, drying, and compressing the wood, followed by extruding the pellets. Each stage of the process requires an investment of energy, which increases production costs but is vital to the quality of the final product.

For pelletization to be effective, the wood must have uniform moisture content of 12-15%. This can be achieved simply by air drying the wood pile or circulating fresh air through wood stored in large bins. This method is time-intensive and may require large storage areas. Other drying methods include rotary drum dryers that use direct heat and conveyer belt systems with heated air.

Raw woody material must be chipped into small pieces and ground into powder by a hammermill, which uses free-swinging hammer bars affixed to a rotating axle to pulverize the wood. The particles fall through a screen that ensures uniform size and are fed into the pelletizer itself, which compresses the material and forces it through small-diameter holes in a flat die. The emerging pellets are knocked from the die and collected.

Large-scale industrial pelletizers operate at high enough temperatures and pressures that lignin, the natural binding material in wood, seals the pellet together. For smaller pelletizers it may be necessary to add a supplemental binding agent such as paraffin or vegetable oil.

Raw woody material must be chipped into small pieces as part of the pellet-making process. Photo courtesy of iStockphoto.

Can a community in rural Alaska produce its own wood pellets?

The ongoing research and development of small-scale pelletizing machines suggests the short answer is yes, although the costs and benefits of any pelletizing operation must be studied carefully.

The use of wood pellets and pellet stoves in Alaska is increasing. Production facilities at Delta Junction and North Pole are among the first wood pellet projects in the state. In Juneau, Sealaska is proposing a pellet-fired heating system in its headquarters that would utilize local wood resources and displace 35,000 gallons of heating oil annually. The community of Gulkana is producing pellets from locally harvested trees, which are used in a pellet-fired boiler along with cordwood boilers to heat nine community buildings.

The primary economic advantage of producing pellets locally is the elimination of transportation costs, which can more than double the price of pellets when they are shipped long distances. A community interested in producing its own pellets from a locally harvested resource must first consider a number of factors, including the high purchase, operating, and maintenance costs of pelletizing equipment, securing a long-term supply of raw woody material, the potential local/regional market for pellets, the cost of residential pellet stoves and/or large-scale boilers, and the technical skills required to run a pellet-making operation.

Fortunately there are resources available to assist communities in evaluating the potential for local pellet production. The Alaska Energy Authority, U.S. Forest Service, Alaska Wood Energy Development Task Group, and other state, federal, and private organizations are all working toward biomass energy development in Alaska.

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U.S. Forest Service — www.fs.fed.us/woodybiomass
Alaska Division of Forestry — www.forestry.alaska.gov

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